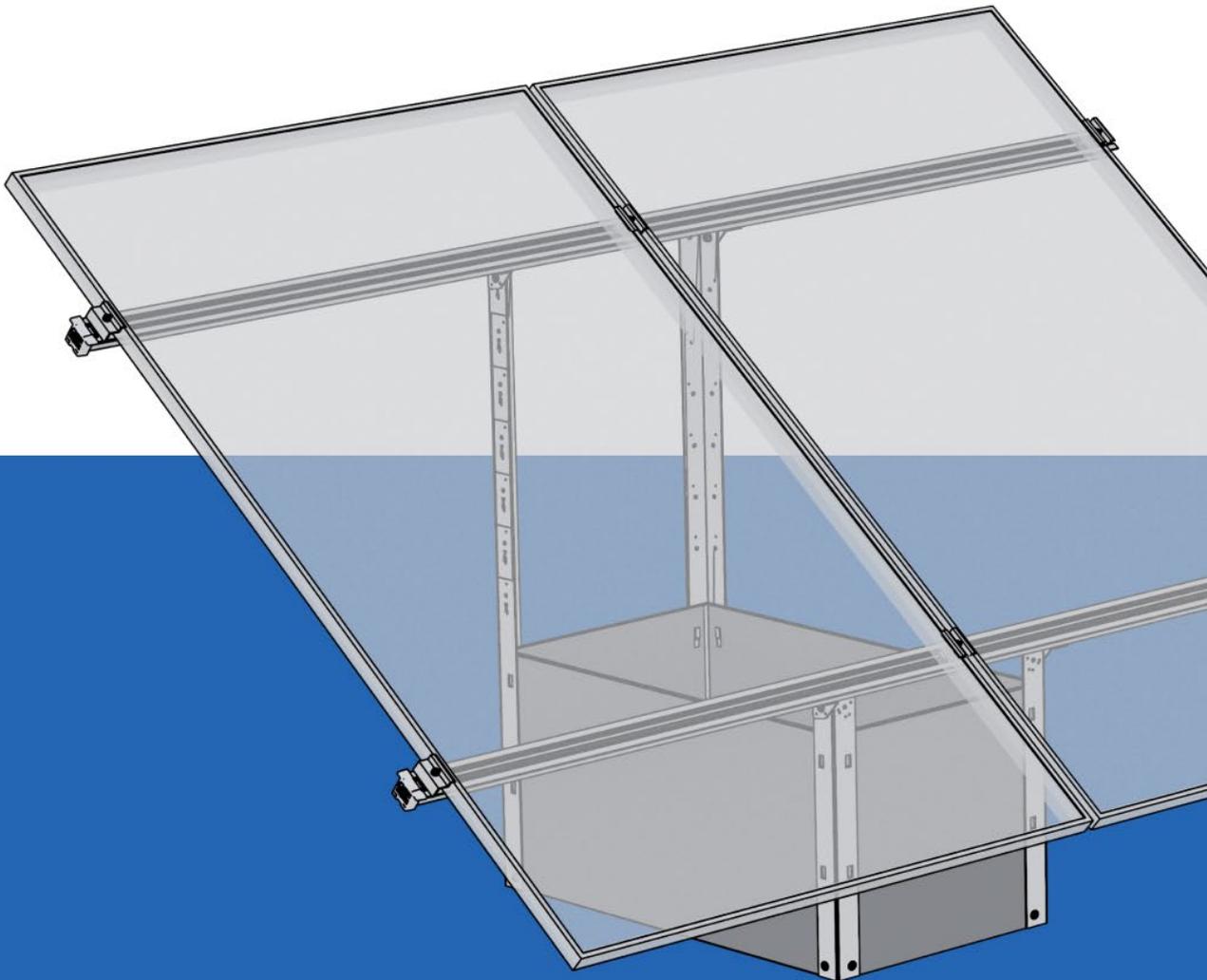


GSE GROUND SYSTEM EVOLUTION

New generation of ground-mounting PV structures
Faster, easier and more sustainable



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01

Preamble

1

Introduction

Préambule

The GSE GROUND SYSTEM Evolution is a **ground-mounting system** designed to make photovoltaic panel installation as **quick and easy** as possible. Its modular design enables intuitive installation, requiring only standard tools and a small team.

The system has been engineered to deliver **robustness, durability and safety**.



This installation manual describes the essential steps to ensure compliant and reliable installation.

It must be used in conjunction with the module manufacturer's instructions, particularly for cabling and electrical connections.

If you have any questions or doubts about any stage of the process, our team will be more than happy to support you.



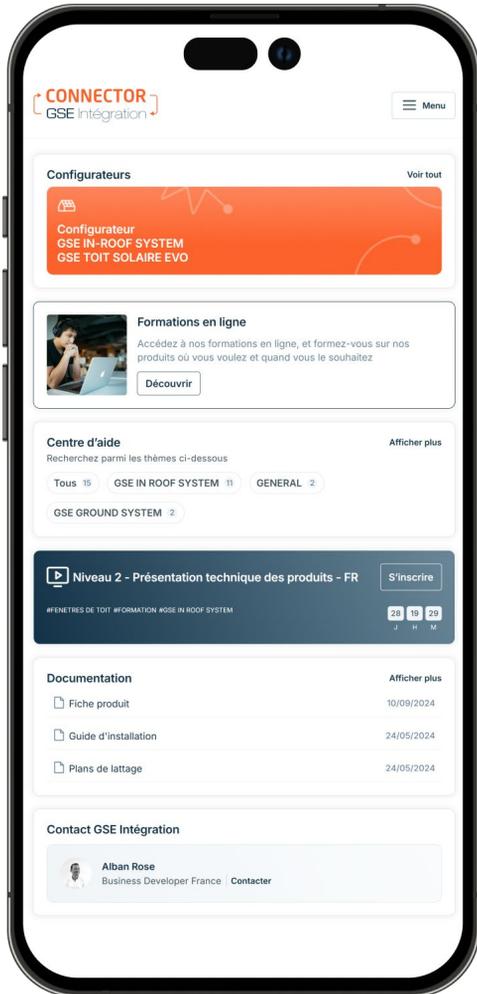
The GSE GROUND SYSTEM is not intended for installation at height: terraces, rooftops, coastal locations, or altitudes exceeding 900 metres.

2

Site preparation

Preamble

Before commencing installation, ensure that you have configured your project using CONNECTOR.



Configuring your project with CONNECTOR enables you to obtain the information you need to prepare the site correctly and ensure that your installation complies with regulations.



Optimise the number of modules for a given surface area



Generate structural calculations for your project



Determine the required ballasting for each ballast box



Automatically generate the complete system configuration for your project



Produce a bill of materials



Save time when preparing orders and quotations

3

Training

Preamble

Before undertaking any installation, we strongly recommend completing our online training module dedicated to the GSE GROUND SYSTEM Evolution, which is available on our CONNECTOR platform.

This training will enable you to:



Understand the key installation steps in detail



Learn best practices for quick and safe assembly



Anticipate critical issues that may arise on site



Reduce the risk of errors and non-compliance.

4

Safety

Preamble

Safety on site is of paramount importance. Every installation technician must comply with the local regulations and use appropriate personal protective equipment.

Our company only supplies the mounting system and does not provide safety equipment.

We urge you to carefully read this manual in its entirety before commencing installation.

When installing the ground-mounting system, pay particular attention to:



Wearing gloves when installing metal components



Wearing a hard hat on site



Wearing safety goggles during cutting or drilling work



Observing the local regulations and standards for lifting, handling and electrical connections.

02

Overview of the system

1

Scope of application

Overview of the system

GSE GROUND SYSTEM Evolution is a **ballasted ground-mounting system**. It can withstand winds up to 31 m/s, provided that it is sufficiently ballasted. It must be installed on level ground and may be installed in the **following terrain categories**:



II : open countryside with few obstacles



IIIa : countryside with hedges



IIIb : urbanised or industrial zones



IV : urban zones

2

Exclusions

Overview of the system

GSE GROUND SYSTEM Evolution may not be installed in the following cases:



Installation at height is strictly prohibited: terraces, rooftops, mounds, etc



Terrain category 0: coastal areas or seafronts



Terrain at altitudes exceeding 900 metres

Plan your project on our online configurator now to ensure that your installation complies with regulations



3

Optimised configuration

Overview of the system

Use CONNECTOR to optimise configuration of your project and ensure that your installation complies with regulations: www.connector-gseintegration.com

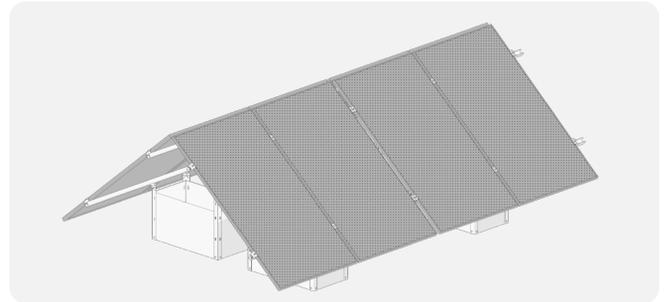


On Connector, you'll have the option of choosing between an East/West or a South configuration



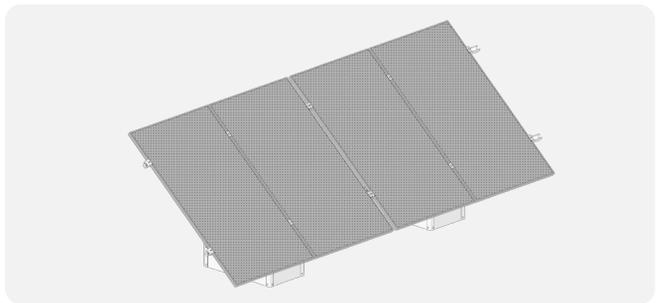
EST/WEST orientation

Greater panel density
Electricity production smoothed throughout the day



SOUTH orientation

Superior PV performance
Reduced ground footprint



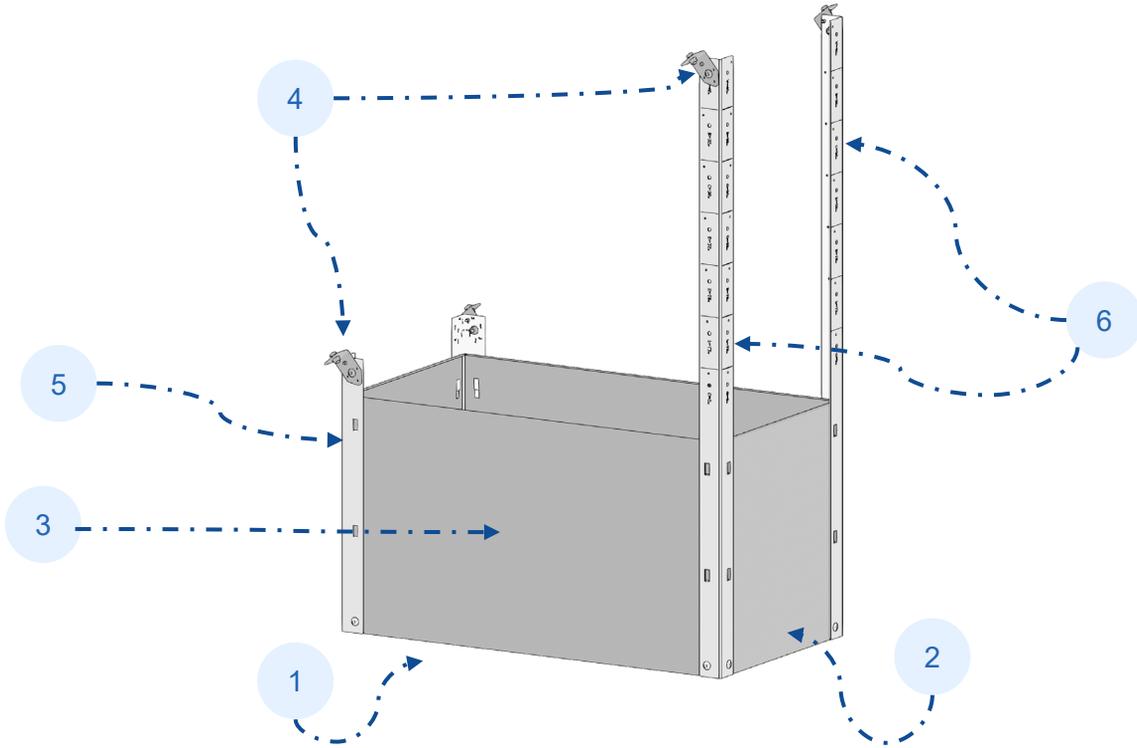
You will receive recommendations for an incline and ballasting for each ballast box depending on your chosen orientation and the other project criteria that you entered.

4

Names of the system components

Overview of the system

Names of the boxes



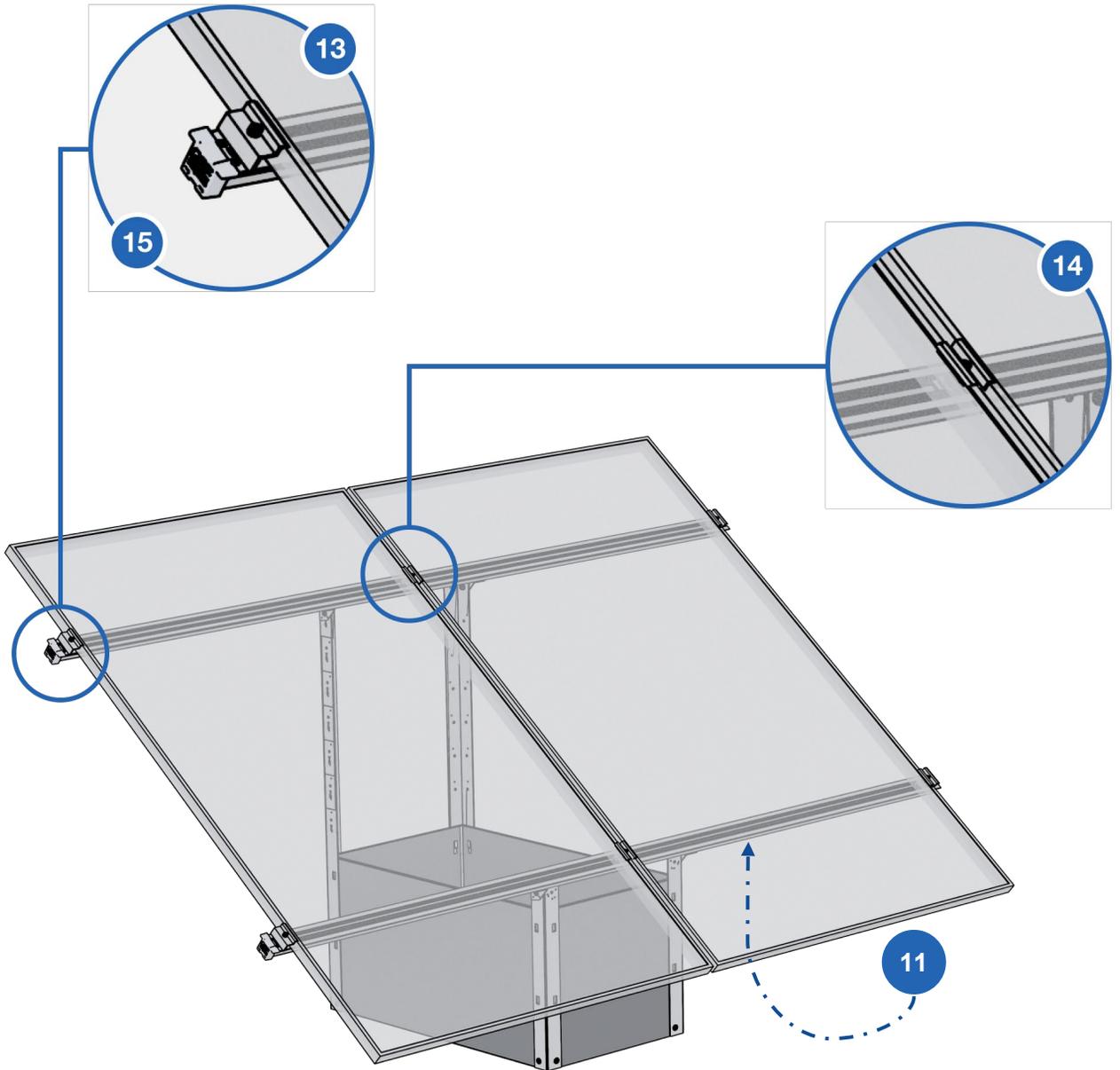
Ref	GSE article number	Description
1	ART106513	Box base
2	ART106520	Front/Back box side
3	ART106527	Left/Right box side
4	ART106534	Square
5	ART106555	Front corner
6	ART106562	Back corner
7	ART106569	M8x20 Screw
8	ART100743	M8 Nut
9	ART106541	M4x12 Screw
10	ART106547	M4 Nut

4

Names of the system components

Overview of the system

Securing the PV modules



Ref	GSE article number	Description
11	ART104707	Rail 2.40m
12	ART105568	Rail connector with 4 screws
13	Code selon module PV	End clamp
14	Code selon module PV	Middle clamp
15	ART101691	Rail plug

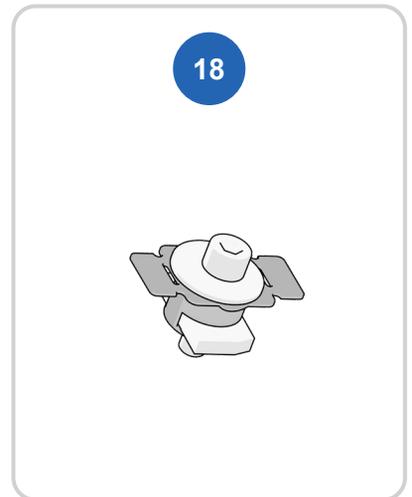
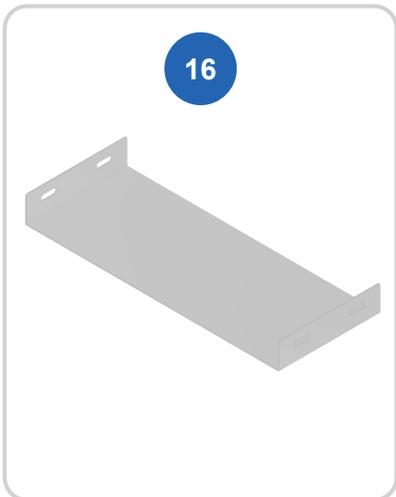
4

Names of the system components

Overview of the system

Accessories

Ref	GSE article number	Description
16	ART106940	Mounting accessory for AC/DC isolator
17	ART101025	Corrosion protection spray
18	ART101060	Screw micro-inverter fixing





Preparing for installation

1

Tools required for installation

Preparing for installation

In addition to your personal protective and safety equipment, you will need:

Visseuse
Electric screwdriver



Couple de serrage
réglable obligatoire

Tape measure



Allen keys



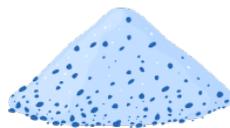
2 sizes : 3 mm / 6 mm

Marking accessories



White marker, pencil, etc.

Ballasting



Gravel, sand, soil concrete, etc.
(refer to Connector for amounts)

**Socket or ring spanner for
hex bolts + open-ended
spanner**



2 sizes : 8 mm / 13 mm (M8)

2

Preliminary calculations

Preparing for installation

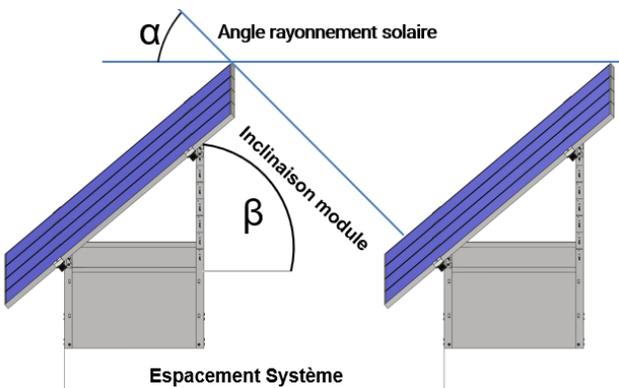


The calculations presented below are performed automatically in CONNECTOR:

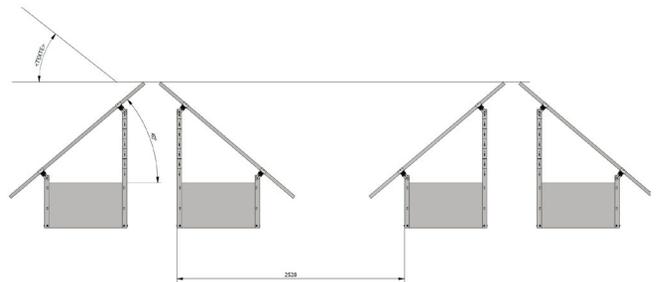
Optimising space

Optimise the space occupied and the performance of GSE GROUND SYSTEM panels, they should be positioned so that none of them cast shadows on the ones behind.

SOUTH orientation



EST/WEST orientation



The spacing between the systems can be determined using the following formula:

$$S = L \times (\sin(\beta) \times \tan(90-\alpha) + \cos(\beta))$$

S = Spacing

L = Length of the associated module's long side

α = Solar radiation angle by location at winter solstice (°)

β = Angle of module incline (°)

Solar radiation angle (α) by location at winter solstice in the Northern Hemisphere (worst-case scenario):

$$\alpha = 90^\circ - \text{Latitude of location} - 23,4^\circ$$

3

Preliminary calculations

Preparing for installation

Rail overhang and positioning of the first ballast box

Determine the rail overhang D_R from the first ballast box using the formula below:

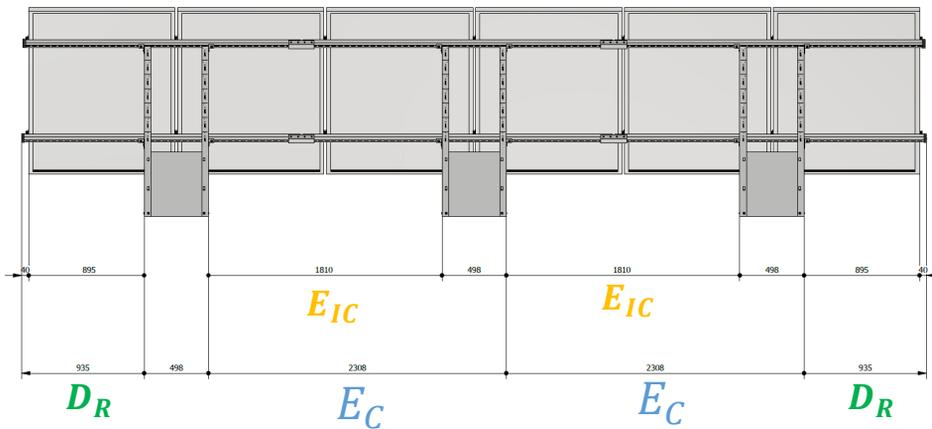
$$D_R = Width_{PV} - 199$$

Spacing between the ballast boxes

Determine the spacing E_{IC} and E_C for subsequent ballast boxes using the formula below:

$$E_{IC} = 2Width_{PV} - 458$$

$$E_C = 2Width_{PV} + 40$$

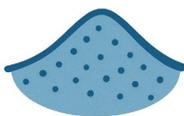


Ballasting

The location, module incline and project orientation must be known to determine the required ballasting

The minimum ballasting per ballast box is 100 kg.

Ballast box volume: 0.227 m³



Dry sand
1800kg/m³,
i.e. 400 kg/ballast box



4/20 masonry gravel
1500kg/m³,
i.e. 335kg/ballast box



Concrete slabs
40 x 40 x 3,7 cm (12,8kg),
26 slabs/ballast
i.e. 330kg/ballast box

04

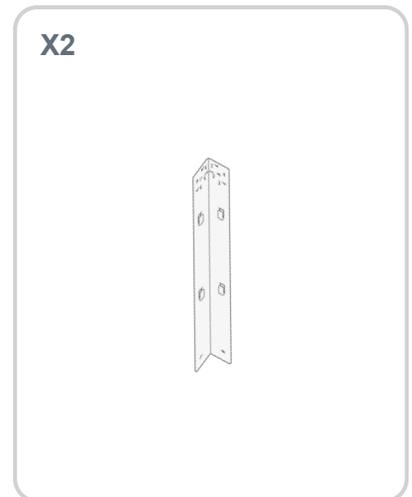
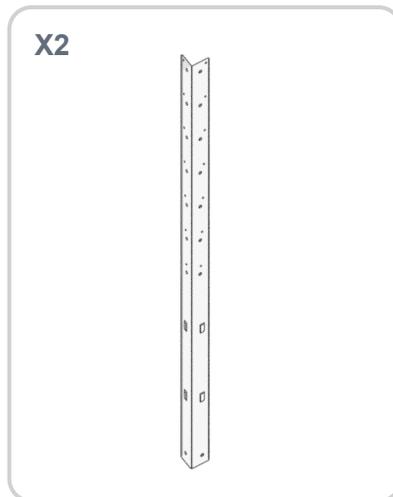
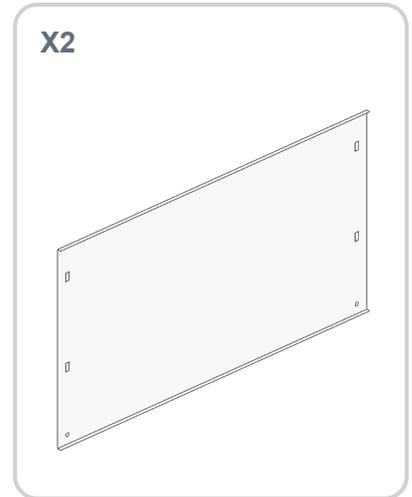
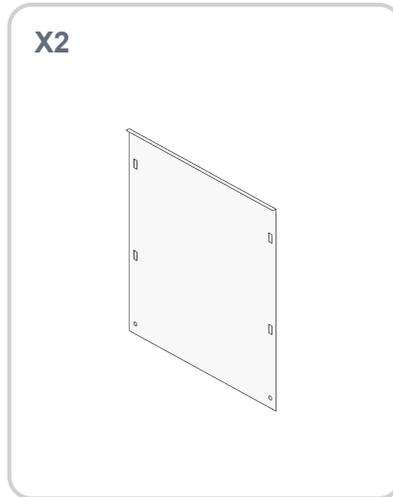
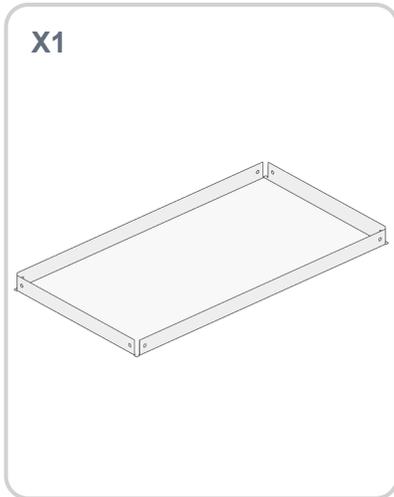
Assembling the Ground System

1

Assembling the ballast boxes

Assembling the Ground System

Equipment for one ballast box:



Note*

If installation at an incline other than 40° is planned, it may be easier to proceed with step 2 (page 22, 'Adjusting the incline and cutting the back corner (5)') before this step.

Watch the assembly video and more besides on CONNECTOR



1

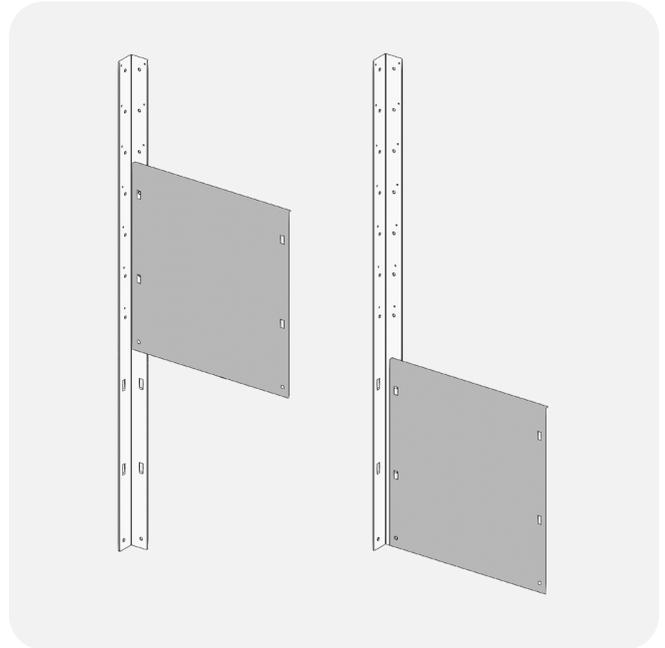
Assembling the ballast boxes

Assembling the Ground System

1

Assemble a first back corner (6) with a front / back box side (2) using the notches and lugs.

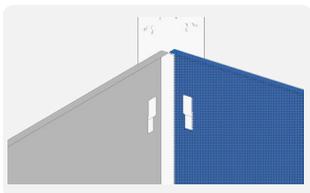
To continue installing all the side walls in the correct orientation, ensure that the drill holes are at the bottom of the walls



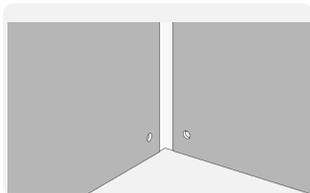
2

Next, fit the second back corner (6) to the assembly in the same way.

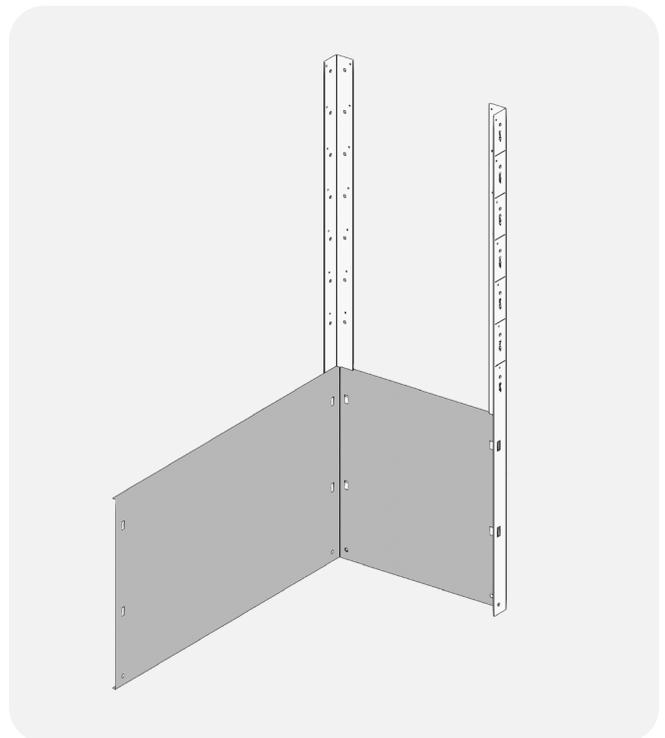
Finally, join one of the left / box side (3) to the hooks of one of the back corner (6)



Check that the notches are at the bottom of the hooks



Check that the drill holes at the bottom of the walls are aligned with one another



Watch the assembly video and more besides on CONNECTOR



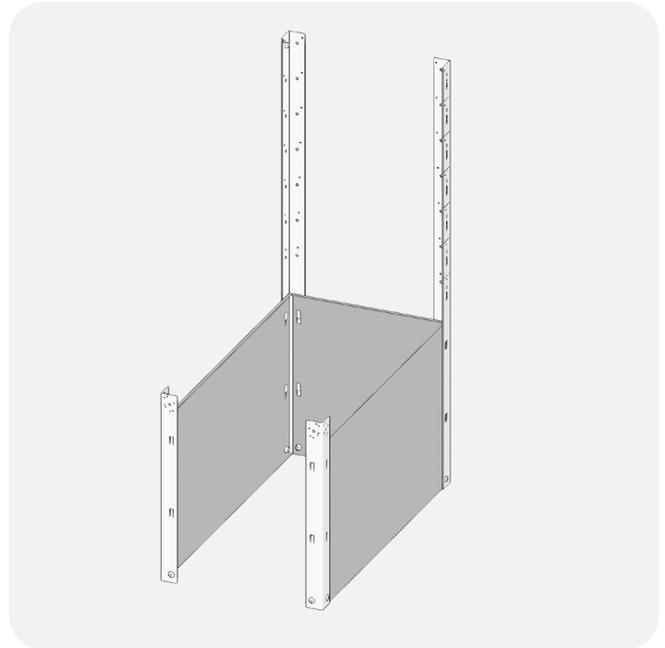
1

Assembling the ballast boxes

Assembling the Ground System

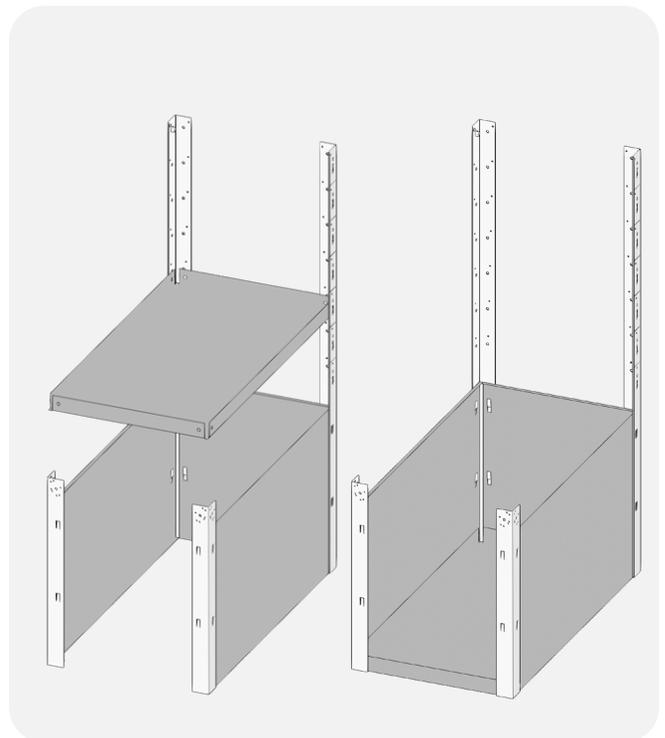
3

Proceed in the same way as described in the previous step for the final left / right box side (3) and the two front corners (5) until your assembly looks like this



4

Insert the box base (1) inside the already assembled structure



Watch the assembly video and more besides on CONNECTOR



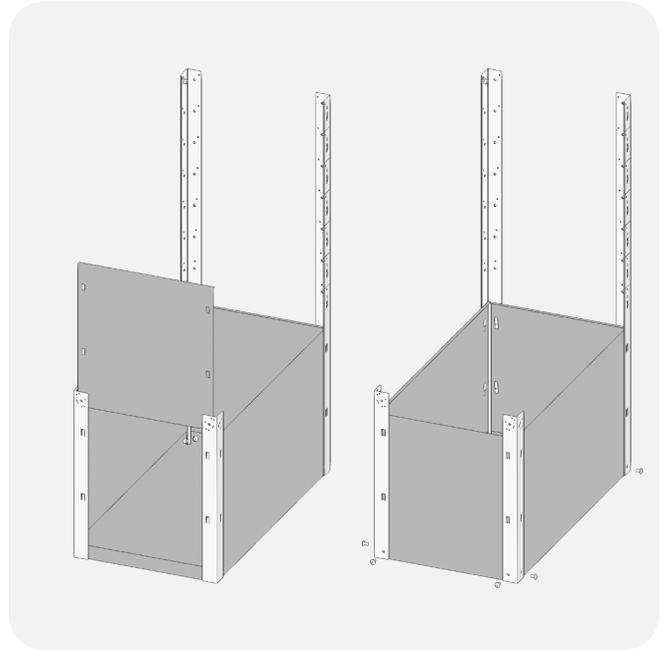
1

Assembling the ballast boxes

Assembling the Ground System

5

Slide the final front/back box side (2) downwards between the two front corners (5) and the box base (1). Ensure that the hooks of the front corners (5) engage with the notches of the front/back box side (2). Finally, insert the 8 M8 bolts at the bottom of the 4 squares of the ballast box (2 bolts per corner) and tighten using the 8 M8 nuts. Ensure adequate tightening torque (min. 16 Nm)



Watch the assembly video and more besides on CONNECTOR

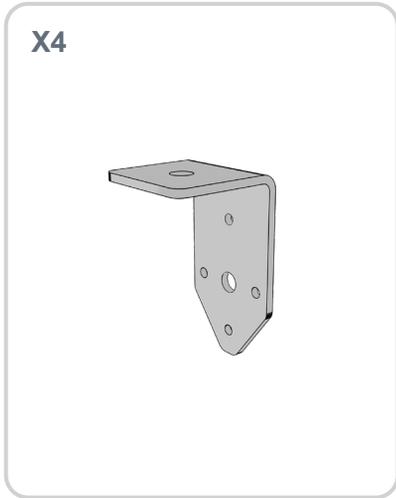


2

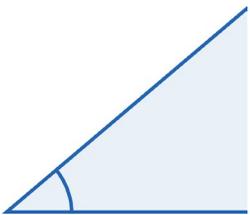
Ajusting the incline

Assembling the Ground System

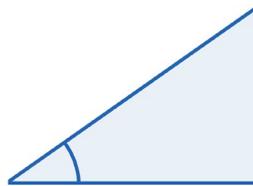
Equipment for one ballast box:



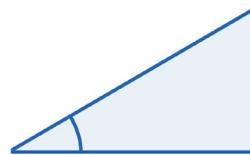
The module incline is adjustable across 7 different angles:



A = 40°



B = 35°



C = 30°



D = 25°



E = 18°



F = 12°



G = 5°

Watch the assembly video and more besides on CONNECTOR



2

Ajusting the incline

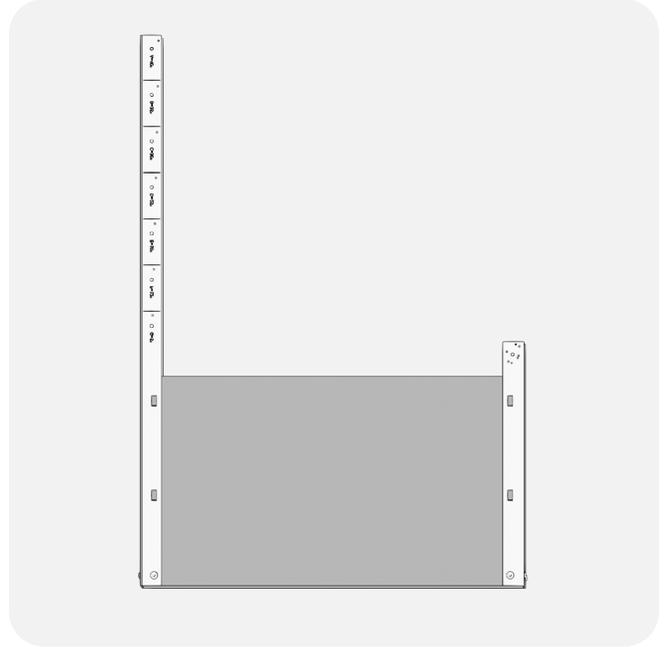
Assembling the Ground System

1

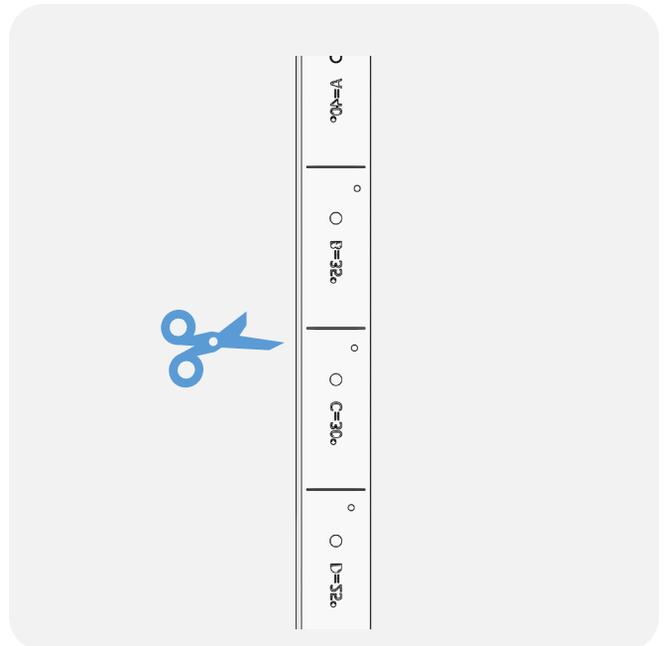
Cutting the back corners

The default incline is 40° and requires no cutting.

If you are planning a 40° installation, proceed directly to step 2 on page 24



For installation at an incline other than 40°, locate the desired incline and associated letter on back corners (6). Then cut, following the cutting line located above the desired incline



 Never cut the front corners (5)

Watch the assembly video and more besides on CONNECTOR



2

Ajusting the incline

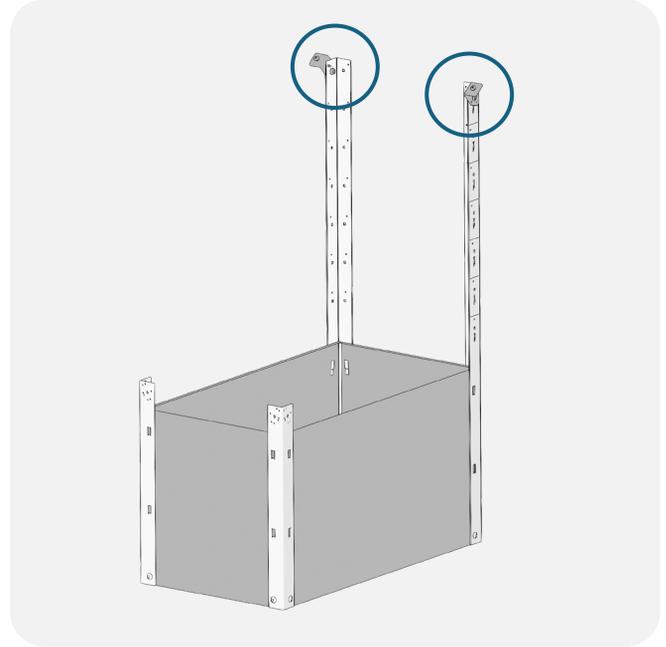
Assembling the Ground System

2

Installing the squares on the back corners

The squares (4) are installed at the very top of the back corners. Locate the letter (and incline) situated at the top of the back corners on the outside of the back corners. Refer to step 1 on page 23 if this marking does not correspond to the desired incline.

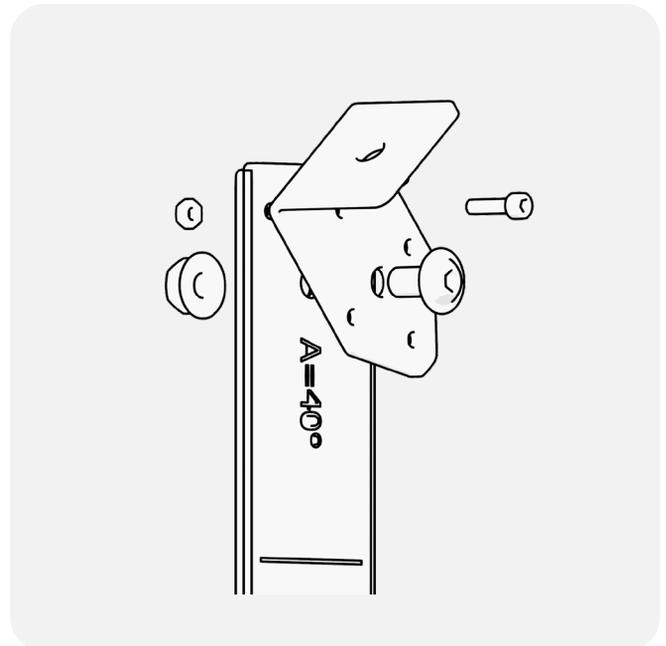
Assemble the first square on one of the back corners using the M8 bolt and nut. Tighten the nut so that the square can still move slightly.



Lock the angular position of the square using the M4 bolt and nut, passing the bolt through the topmost small drill hole in the square and the one in the back corners. (See image)

Tighten both bolts, with a minimum torque of 16 Nm for the M8 bolt.

Repeat these steps with a second square and the second back corner.



Watch the assembly video and more besides on CONNECTOR



2

Ajusting the incline

Assembling the Ground System

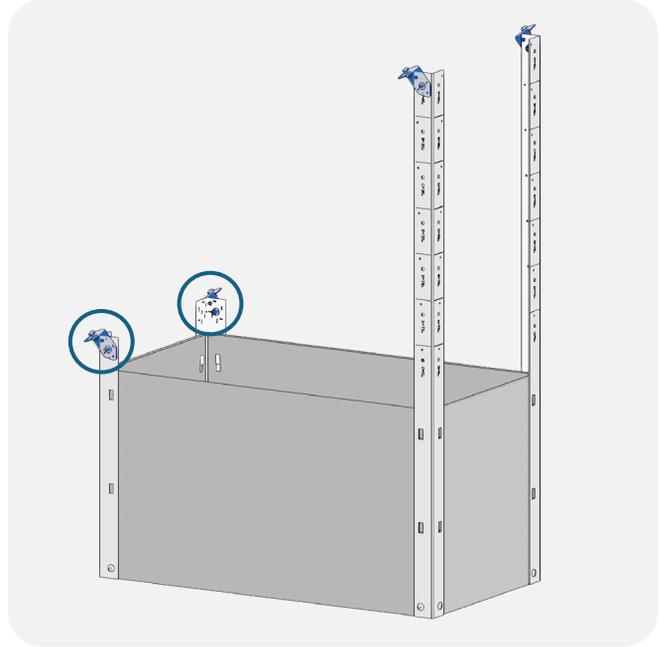
3

Installing the squares on the front corners

The squares are installed at the top of the front corners on the long sides of the ballast box.

Assemble the first square on one of the front corners using the M8 bolt and nut. Tighten the nut so that the square can still move slightly.

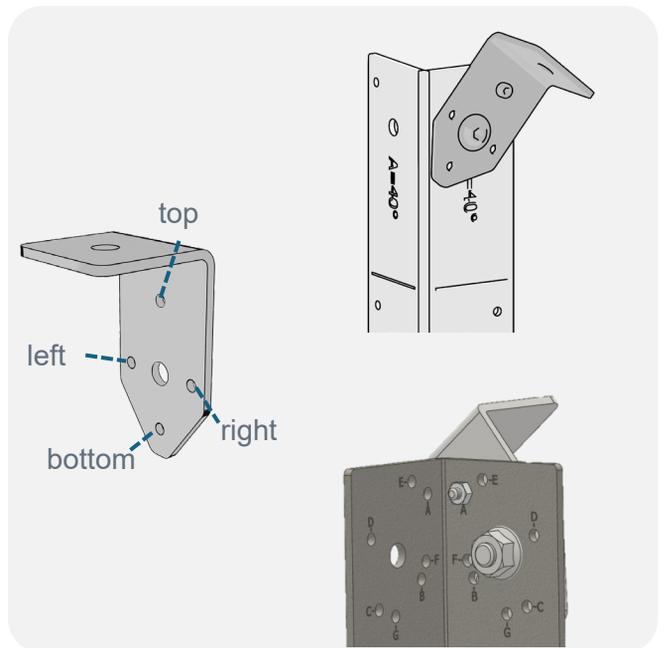
Lock the angular position of the square using the M4 bolt. Insert the bolt through the drill hole in the square associated with the letter identified in step 1 on page 23 (see the table below), then through the drill hole in the front corner marked with this same letter. Tighten with the M4 nut.



Incline	Associated letter	square drill hole
40°	A	TOP
35°	B	RIGHT
30°	C	BOTTOM
25°	D	LEFT
18°	E	TOP
12°	F	RIGHT
5°	G	BOTTOM

Tighten both bolts, with a minimum torque of 16 Nm for the M8 bolt.

Repeat these steps with a second square and the second front corner.



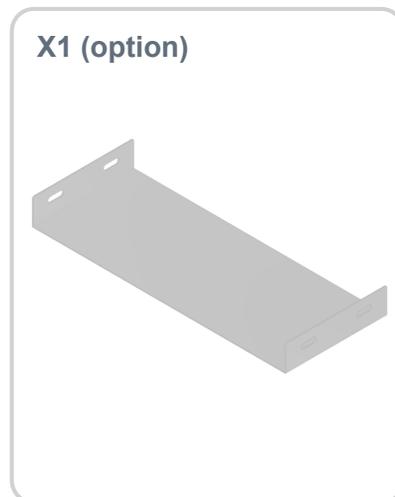
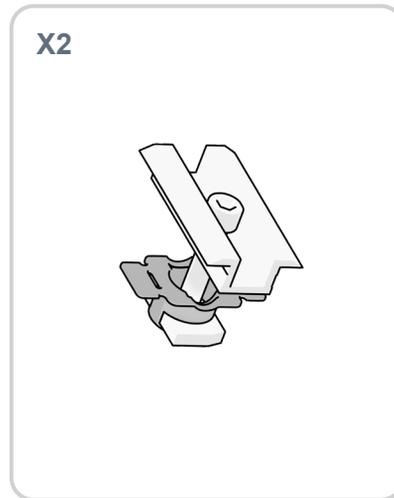
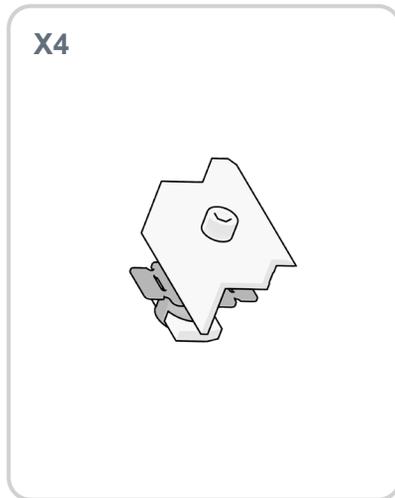
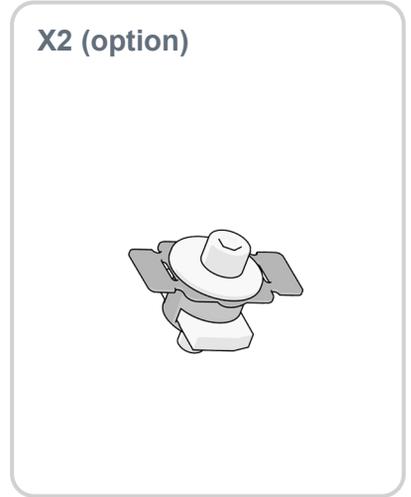
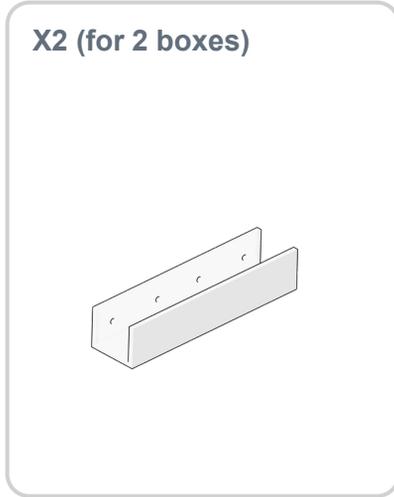
Watch the assembly video and more besides on CONNECTOR

3

Securing the PV modules

Assembling the Ground System

Equipment for one ballast box:



Watch the assembly video and more besides on CONNECTOR



3

Securing the PV modules

Assembling the Ground System

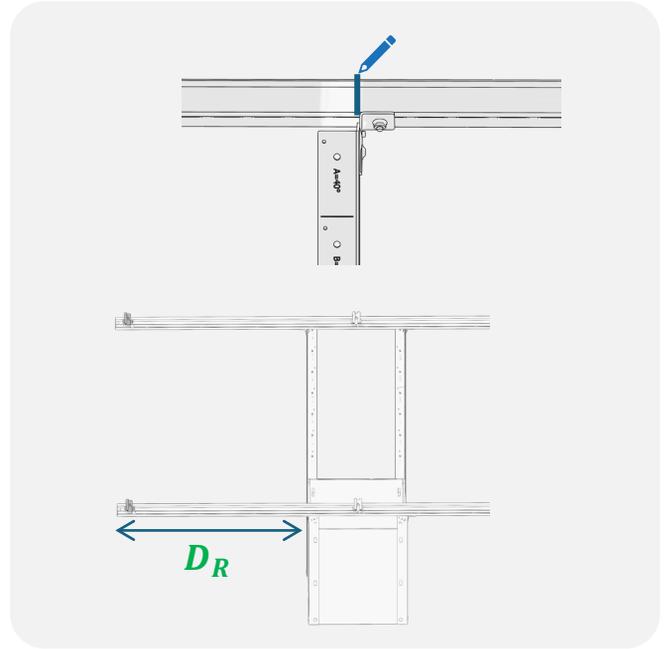
1

Installing the rails on the first ballast box

Mark the position of the first ballast box's squares on the rails based on the calculations performed earlier for the rail overhang and the ballast box position.

Position the rail so that the mark is aligned with the back corners located at the end of the future module row. Then secure the rail by inserting an M8 bolt through the slotted holes and the square drill hole. Tighten with an M8 nut. Do the same with the second square on the same rail.

Repeat these steps with the front corner set.



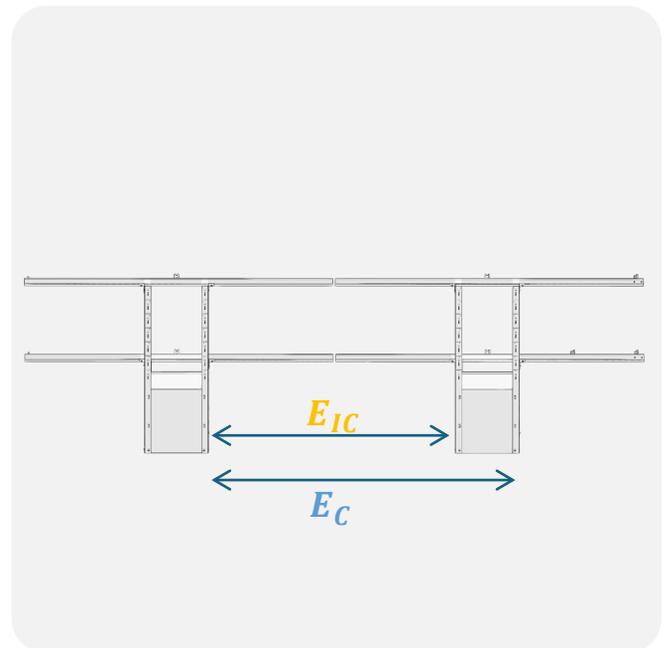
2

Installing the rails on the next ballast boxes

Mark the position of the second ballast box on the ground based on the calculations performed earlier for the spacing between the ballast boxes.

Position the ballast box so that the mark is aligned with the bottom of the ballast box. Place the rail on the squares of the back corners, leaving a 20 mm gap with the rail from the previous ballast box. Next, secure the rail on the two squares using an M8 bolt and nut, as described in the previous step.

Repeat these steps with the front corner set.



Watch the assembly video and more besides on CONNECTOR



3

Securing the PV modules

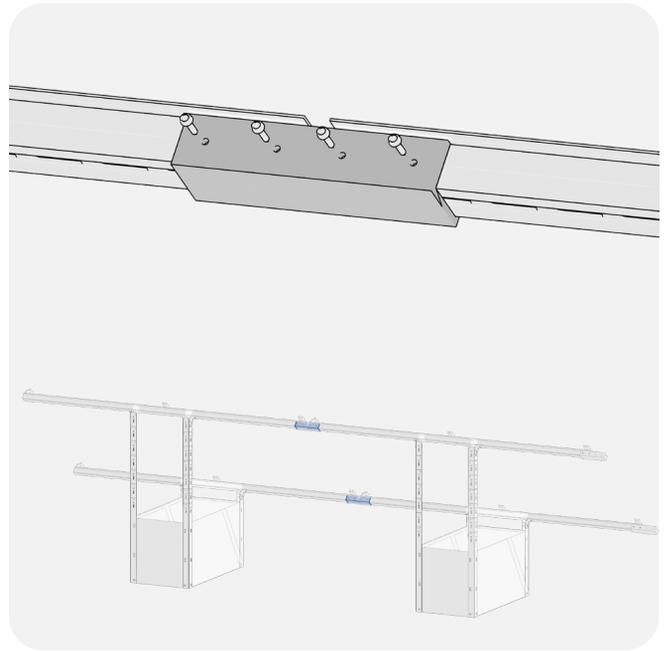
Assembling the Ground System

3

Installing the rail connectors

The rail connector is positioned at the junction of two rails. Slide the connector underneath the rails and centre it relative to the 20 mm gap between the rails. Screw the 4 self-tapping screws into the pre-drilled holes using an electric screwdriver with a size 8 bit

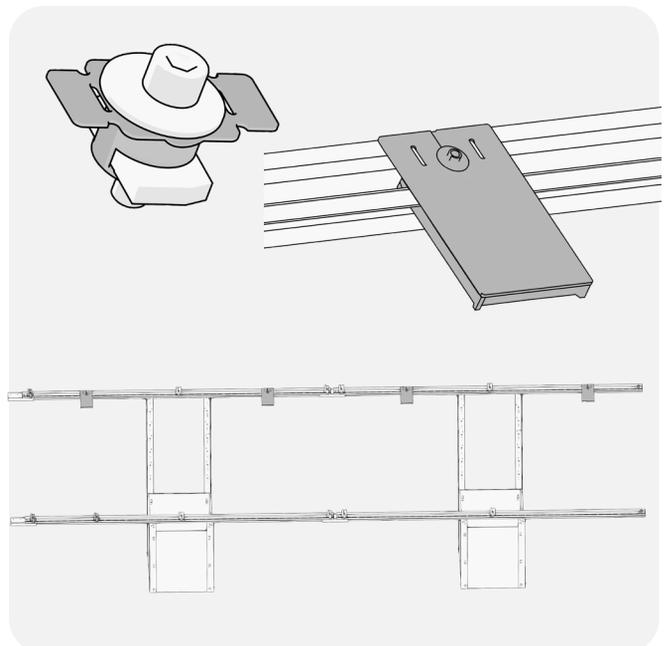
Repeat (as many times as necessary) last 2 steps until you reach the desired row of ballast boxes.



4

OPTIONAL Installing the microinverters

Position the micro-inverter fixing screws by inserting them into the rail, then rotating the plastic ring clockwise. Slide them to approximately 25 cm from the back corners. Then place the microinverter's metal plate under the washer and tighten with an electric screwdriver and a size 6 hexagonal bit



Watch the assembly video and more besides on [CONNECTOR](#)



3

Securing the PV modules

Assembling the Ground System

5

Ballasting the ballast boxes

Ballast the ballast boxes with the ballast quantity determined on CONNECTOR

6

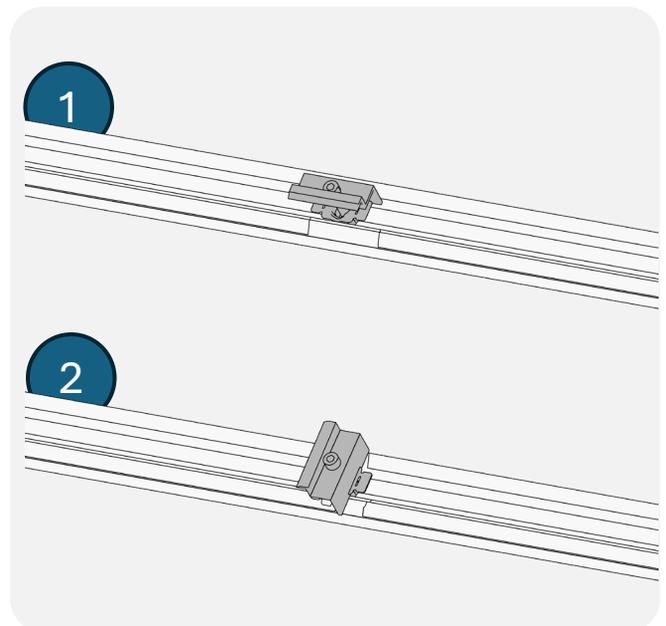
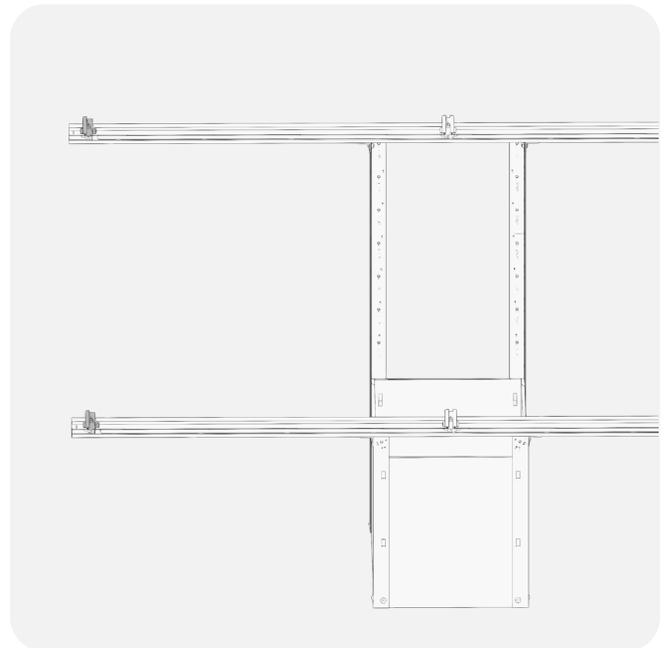
Installing the first module

Measure 40 mm from the end of both first rails and mark the spot. Slide two end clamps, ensuring that they remain behind the 40 mm mark.

Position the first module with its long side along the mark. Ensure that the module is centred relative to the two rails (for a 1,722 mm module, the base of the module is located 329 mm from the top of the rail). Once the module is in the correct position, tighten both end clamps with an electric screwdriver and a size 6 hexagonal bit.

Position the middle clamps by inserting them into the rail, then rotating the plastic ring clockwise.

Press the middle clamps against the first module. Tighten them slightly to hold the first module in place.



Watch the assembly video and more besides on CONNECTOR



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Securing the PV modules

Assembling the Ground System

7

Installing the next modules

Place the second module on the rails, pressing it against the middle clamps.

Tighten the middle clamps once the second module has been centred on the rails. Add a pair of middle clamps to the rails. Press them against the second module and tighten slightly to hold the second module in place.

Repeat these steps up to the last module in the row

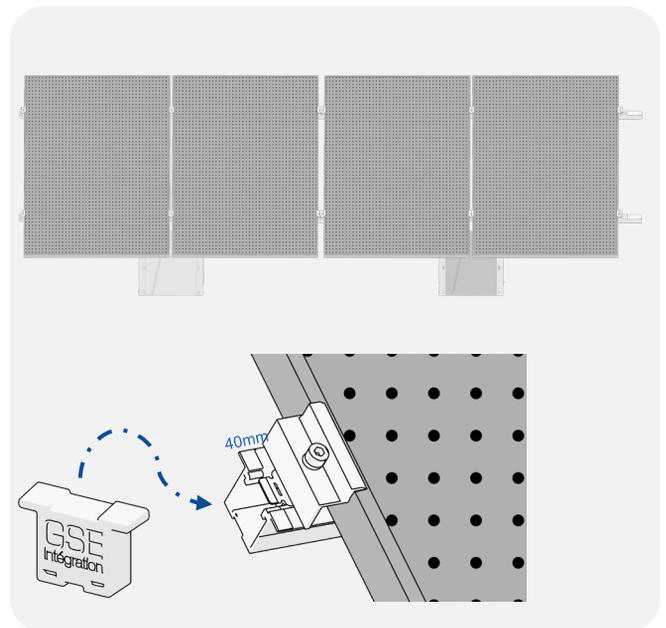
8

Installing the final module

Once the last module is in position, add a pair of end clamps and tighten them to hold the module in place.

Make a mark on the rails 40 mm from the frame of the last module in the row. Cut off the excess rail beyond the mark.

Place the 4 rail plugs at both ends of the row.



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3

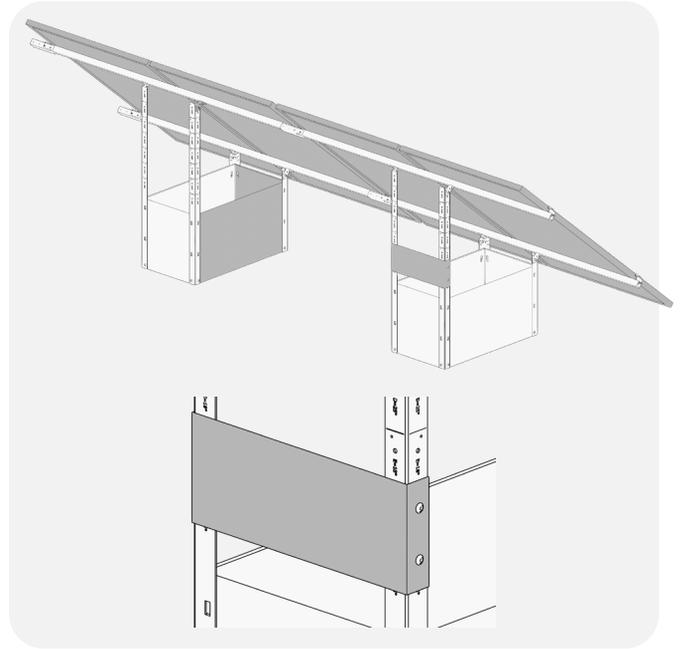
Securing the PV modules

Assembling the Ground System

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OPTIONAL Securing the junction boxes

A dedicated plate for securing the junction boxes is available as an option.



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Electrical connection

You may now implement the electrical part of the installation.

- Earth the structure using one of the ballast box or angle bracket components. For practical reasons, we recommend fixing the cable lug to the bottom rail and securing the cable along the entire length of the rail using cable ties.
- Earthing must be performed for each panel in parallel, in accordance with regulations.
- In general, take care to observe all safety instructions relating to the burial of electrical cables.
- Also ensure compliance with the electrical standards set out in the UTE C15-712 electrical guide

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Support and
contact

If you have any questions, please do not hesitate to contact us via CONNECTOR in the Contact section.



155-159 rue du docteur Bauer
93400 Saint-Ouen-sur-Seine
FRANCE
Tel.: +33(0)1.70.32.05.05
E-Mail: contact@gseintegration.com

Version 1.0